

IX Acronyms and Abbreviations

°C	Degrees Celsius	ASIC	Application-specific integrated circuit
°F	Degrees Fahrenheit	a-SiGe	Amorphous silicon germanium
2-D	Two-dimensional	ASME	American Society of Mechanical Engineers
3-D	Three-dimensional	ASR	Area-specific resistance
1Q	First quarter of the fiscal year	ASTM	American Society for Testing and Materials
2Q	Second quarter of the fiscal year	atm	atmosphere
3Q	Third quarter of the fiscal year	ATMI	Advanced Technical Materials Incorporated
4Q	Fourth quarter of the fiscal year	ATP	Adenosine triphosphate
6F	Hexafluorinated (biphenol A) sulfonated poly(arylene ether sulfone)	ATR	Autothermal reformer
6F-CN-35	Hexafluorinated / nitrile-functional sulfonated poly(arylene ether sulfone) (35 is the degree of sulfonation, %)	Au	Gold
A	Ampere, amp	AuS	Gold sulfide
Å	Angstrom	AXS	Advanced X-ray Solutions
A/cm ²	Amps per square centimeter	B	Boron
A/D	Analog to digital	Ba	Barium
AC	Alternating current	barg	Bar gauge
ACR	Autothermal cyclic reforming	BAT	Brown adipose tissue
ACS	American Chemical Society	BET	Bruner, Emmett and Teller surface area analysis method
AEM	Analytical electron microscopy	BNL	Brookhaven National Laboratory
AER	Absorption-enhanced reforming	BOP	Balance of plant
AFCIA	Advanced Fuel Cells	BP	British Petroleum
	Implementing Agreement	BPSH	Biphenyl sulfone
AFM	Atomic force microscopy	BSE	Backscatter electron
Ag	Silver	BU	Boston University
AGB	Anode gas burner	C	Carbon
AgCl	Silver chloride	C&C	City and County of Honolulu
AgS	Silver sulfide	CaCO ₃	Calcium carbonate
AIChE	American Institute of Chemical Engineers	CAE	Computer-aided engineering
	Analytical Interatomic Potential (computer model)	CaFCP	California Fuel Cell Partnership
AIP		CANMET	Canada Center for Mineral and Energy Technology
AirCred	Air Quality Credits tool	CaO	Calcium oxide
Al	Aluminum	CAPEX	Capital expense
Al ₂ O ₃	Aluminum oxide	CATA	Centre Area Transit Authority
ANL	Argonne National Laboratory	CAU	Clark Atlanta University
ANSI	American National Standards Institute	cc	Cubic centimeter
		cc/g cat/hr	Cubic centimeters per gram catalyst per hour
Ap	Pool contact area	CCD	Charge coupled device
APU	Auxiliary power unit	CCH	Complex compound hydride
Ar	Argon	CCHSS	Complex compound hydrogen storage system
As	Arsenic	CCM	Catalyst-coated membrane
ASF	Amps per square foot		
a-Si	Amorphous silicon		

ccm	Cubic centimeters per minute	CS&D	Compression, storage and dispensing
Ce	Cerium	CSA	Cell stack assembly
CE	European Commonwealth certification mark	CSFTP	Cold-Start Federal Test Procedure
CEC	California Energy Commission	CSMP	Cabot Superior MicroPowders
CeCl ₃	Cerium trichloride	CSTT	Codes and Standards Tech Team
CEM	Compressor/Expander/Motor	CTO	Conductive transparent oxide
CEM	Continuous emissions monitoring	CTQ	Critical to quality
CeO ₂	Ceric oxide	Cu	Copper
Cermet	Combination of ceramic and metal	cu.yd.	Cubic yard
CESI	Catalytica Energy Systems, Inc.	Cu ₂ O	Cuprous oxide
CFD	Computational Fluid Dynamics	Cu ₂ S	Copper Sulfide
CGA	Compressed Gas Association	CUTE	Clean Urban Transport for Europe
CGO	Cerium gadolinium oxide	CV	Cyclic voltammetry, cyclic voltammogram
CH ₂	Compressed hydrogen gas	CVD	Chemical vapor deposition
CH ₃ CHO	Acetaldehyde	CWRU	Case Western Reserve University
CH ₄	Methane	DBEDT	Hawaii Department of Business, Economic Development and Tourism
Chl	Chlorophyll	DC	Direct current
CHP	Combined heat and power	DCEC	Delaware County Electric Cooperative, Inc.
CIGS	Copper-indium-gallium-diselenide	DE	Distributed electrolysis
CIS	CuInSe	DFMA	Design for Manufacturing and Assembly
CL	Catalytic layer	DFT	Density Functional Theory
Cl	Chlorine	DGE	Diesel gallon equivalent
CLV	City of Las Vegas	DHW	Domestic hot water
cm	Centimeter	DI	Deionized
cm ²	Square centimeter	dL/g	Deciliters per gram
CME	Coefficient of Moisture Expansion (i.e. water swelling)	DMA	Dynamic mechanical analysis
CMOS	Complementary metal oxide semiconductor	DMAc	Dimethyl acetamide
CMSA	Consolidated metropolitan statistical area	DMC	Dimethylcarbonate
CNC	Computer numerical control	DMFC	Direct methanol fuel cell
CNG	Compressed natural gas	DMSO	Dimethyl sulfoxide
CO	Carbon monoxide	DNA	Deoxyribonucleic acid
Co	Cobalt	DOE	U.S. Department of Energy
CO ₂	Carbon dioxide	DOE EIA	Department of Energy, Energy Information Agency
COS	Carbon oxysulfide	DOS	Density of states
CO _x	Oxides of carbon	DP	Dew point
cpi	Cells per inch	DRIFTs	Diffuse reflectance infrared
CPOx	Catalytic partial oxidation	DSU	Fourier transform spectroscopy
cpsi	Cells per square inch	e ⁻	Delaware State University
CPSS	Combinatorial powder synthesis system	E	Electron
Cr	Chromium	E _{1/2}	Potential
CS	Constant stoichiometry		Half-wave potential

Ea	Activation energy	FP	Fuel processor
EC	Electrochemical	FPS	Fuel processing system
EC	European Community	FRS	Functional requirement
ECS	Electrochemical Society	ft ²	specifications
ECSA	Electrochemical surface area	FTA	Square feet
EDAX	Energy dispersive X-ray	FUDS	Federal Transit Administration
EDC	Valence electron energy distribution curve	fWGS	Federal Urban Driving Schedule
EDS	Energy dispersive x-ray spectroscopy	FY	Forward water-gas shift
EERE	Office of Energy Efficiency and Renewable Energy	g	Fiscal year
EESM	Electrical energy storage module	g/cc	Gram
ELAT®	Registered Trademark of De Nora North America, Inc., covers GDLs and GDEs	g/min	Grams per cubic centimeter
Ep	Peak potential	g/s	Grams per minute
EPA	U.S. Environmental Protection Agency	Ga	Grams per second
EPMA	Electron probe microanalyzer	GaAs	Gallium
EPR	Electron paramagnetic resonance	GADDs	Gallium arsenic
ESR	Electron spin resonance	gal	General area diffraction system
ESS	Energy storage system	GC	Gallon
EtOH	Ethanol	GC	Gas chromatograph
ETS-10	Engelhard titanium silicate - 10	GC/MS	GenCore
eV	Electron volt	GC5T	Glassy, or vitreous carbon; a pure carbon that is amorphous (non-crystalline)
ExCo	Executive Committee (of HIA)	GCII	Gas chromatograph/Mass spectroscopy
F	Fluorine	GCtool	GenCore 5T platform prototype
F-	Fluorine ion		back-up fuel cell design for telecommunications
FASTER	Feasibility of Acceptable Start Time Experimental Reactor		GenCore Gen II back-up fuel cell design
FC	Fuel cell		Software package developed at ANL for analysis of fuel cells and other power systems
FCCP	Carbonyl cyanide m-chlorophenylhydrazone	GDE	Gas diffusion electrode
FCPP	Fuel cell power plant	GDL	Gas diffusion layer
FCS	Fuel cell system	GDS	Galvanodynamic scan
FCV	Fuel cell vehicle	GE	General Electric
Fe	Iron	GEPC	Galactic Electric Power Cooperative, Inc.
Fe ₂ O ₃	Ferric oxide	GES	Giner Electrochemical Systems, LLC
FEA	Finite element analysis		Gaseous hydrogen
FER	Fluoride emission rate	GH ₂	Greenhouse gas
fg-ELAT	Fine gradient ELAT	GHG	Gas hourly space velocity
FHDS	Federal Highway Driving Schedule	GHSV	Geographic information system
FIRST	Fuel cell Innovative Remote Systems for Telecommunications (Spain)	GIS	Gigajoule
FMEA	Failure modes and effects analysis	GJ	Gram
		gm	Grams per day
		gm/day	Working Party on Pollution and Energy
		GPRE	

GREET	Greenhouse Gas Energy and Emissions in Transportation model	HIA	Hydrogen Implementing Agreement
GSS	Galvanostatic scan	HNEI	Hawaii Natural Energy Institute
GTI	Gas Technology Institute	Hp	Average pool height
GW	Gigawatt	hp	Horsepower
GWe	Gigawatt electric	HPE	Hybrid photoelectrode
h	Hour	hr	Hour
H	Hydrogen	HRTEM	High-resolution transmission electron microscope
HPO_4^-	Ortho-phosphoric acid	HSAC	High surface area carbon
H^+	Proton	HSO_4^-	Bisulfate anion
H_2	Diatomich hydrogen	HT	High-temperature
H_2 ICE	Hydrogen-fueled internal combustion engine	HT	High-throughput
H_2A	Hydrogen Analysis	HTFC	High-temperature fuel cell
H_2O	Water	HTM	High-temperature membrane
$\text{H}_2\text{O:C}$	Steam to carbon ratio	HTS	High-temperature shift
H_2O_2	Hydrogen peroxide	HTSC	High-temperature shift converter
H_2PO_4^-	Dihydrogen phosphate anion	HTXRD	High-temperature X-Ray diffraction
H_2S	Hydrogen sulfide	Hythane	Compressed hydrogen natural gas blend
H_2SO_4	Sulfuric acid	Hz	Hertz
H_3PO_4	Phosphoric acid	I	Current
Hammer	Hazardous Materials	IBAD	Ion beam assisted deposition
HAZOP	Management and Emergency Hazards and Operational Safety Analysis	ICC	International Code Council
HC	Hydrocarbon	ICE	Internal combustion engine
HCl	Hydrochloric acid	ICEV	Internal combustion engine vehicle
HClO_4	Perchloric acid	ICP	Inductively coupled plasma
HCNG	Hydrogen-compressed natural gas	ICP-MS	Inductively coupled plasma mass spectrometry
HDMR	Hydrogen-driven metallurgical reactions	ICR	Interfacial contact resistance
HE	Heat exchanger	IEA	International Energy Agency
He	Helium	IEC	International Electrotechnical Commission
HEM	Hydroxyl ion exchange membrane	IEC	Ion exchange capacity
HER	Hydrogen evolution reaction	IEEE	Institute of Electrical and Electronics Engineers, Inc.
HEV	Hybrid electric vehicle		
Hf	Hafnium	IIT	Illinois Institute of Technology
HF	Hydrofluorhydric acid	In	Indium
HFCIT	Hydrogen, Fuel Cells and Infrastructure Technologies Program	INEEL	Idaho National Engineering and Environmental Laboratory
HFCTF	Hawaii Fuel Cell Test Facility	InP	Indium phosphorus
HFI	Hydrogen Fuel Initiative	IPCE	Incident photon conversion to electrons
HFR	High-frequency impedance	IPHE	International Partnership for Hydrogen Energy
Hg	Mercury	IR	Infrared
Hg_2SO_4	Mercurous sulfate	Ir	Iridium
HHV	Higher heating value	IR	Voltage loss due to resistance

ISE	International Society of Electrochemistry	LEEM	Low-energy electron microscopy
ISO	International Organization for Standardization	LEIS	Low-energy ion scattering
ITM	Ion transport membrane	LEMSYS	Local energy management system
ITO	Indium tin oxide	LH ₂	Cryogenic liquid hydrogen
ITR	Integrated test rig	LHV	Lower heating value
I-V	Current-voltage	Li	Lithium
IV	Inherent viscosity	LiH	Lithium hydride
J	Joule	LLC	Limited Liability Company
K	Kelvin	LLNL	Lawrence Livermore National Laboratory
K	Potassium	low-dP	Low pressure drop
kÅ	1000 angstroms	Lpm	Liters per minute
kbar	1000 bar	LSGM	Lanthanum strontium gallium magnesium oxide
KBr	Potassium bromide		Low-temperature
kBTU	1000 British thermal units	LT	Low-temperature shift
kcal	Kilocalorie	LTS	Meter
kcal/mol	Kilocalories per mole	m	Molar
kDa	Kilo-Daltons	M	Meters per second
KeV	Kilo electron volts	m/s	Square meters per gram
kg	Kilogram	m ² /g	Square meters per second
kg/day	Kilograms per day	m ² /s	Atofina membrane candidate
kg/hr	Kilograms per hour	M31	MilliAmps
khr	1000 hours	mA	Milliamps per square centimeter
KIC	Key industrial collaborators	mA/cm ²	Modified boundary layer
kJ	Kilojoule	MBL	Molten carbonate fuel cell
kJ/mol	Kilojoules per mole	MCFC	Millicoulomb
KOH	Potassium hydroxide	mCoul	Membrane electrode assemble
kPa	Kilopascal	MEA	Mohegan Energy,
kW	Kilowatt	MEEECC	Environmental, Economics Education Center
kWe	Kilowatt electric		Micro Electromechanical System
kWh	Kilowatt-hour		Micro-grid Energy Management System
kWh/kg	Kilowatt-hours per kilogram	MEMS	Methanol
kWh/L	Kilowatt-hours per liter	MEMSYS	Maximum Expected Operating Pressure
kWt	Kilowatt thermal		Milliequivalents
L	Liter	MeOH	Milliequivalents/gram
L/h	Liters per hour	MEOP	Magnesium
L/min	Liters per minute		Microgram
La	Lanthanum	meq	Milligram
LANL	Los Alamos National Laboratory	meq/gram	Magnesium hydroxide
LAX	Los Angeles International Airport	Mg	Milligrams per square centimeter
lb	Pound	mg	Magnesium chloride
LBNL	Lawrence Berkeley National Laboratory	Mg(OH) ₂	Magnesium hydride
LCC	Lansing Community College	mg/cm ²	Magnesium oxide
LCHPP	Low Cost Hydrogen Production Platform (DOE Program Title)	MgCl ₂	Metal Hydride Center of Excellence
LDV	Light-duty vehicle	MgH ₂	
LED	Light-emitting diode	MgO	
		MHCoE	

min	Minute	MYRDDP	Multi-Year Research, Development and Demonstration Plan
MJ	Megajoules		
mL	Milliliter		
ml/h	Milliliters per hour	N	Nitrogen
µm	Micrometer, micron	N/cm ²	Newton's per square centimeter
µM	Micromolar	N112	Nafion 1100 equivalent weight, 2 millimeter thick membrane
mm	Millimeter		Diatomeric nitrogen
MM	Molecular modeling	N ₂	Sodium
MMBtu	Millions of British thermal units	Na	Trisodium hexahydroaluminate
µmol	Micromole	Na ₃ AlH ₆	Sodium aluminum hydride
MMOM	Microporous metal oxide matrix	NaAlH ₄	(sodium tetrahydroaluminate)
Mn	Manganese		Sodium borohydride
MO	Fetal Organic Framework	NaBH ₄	Sodium chloride
Mo	Molybdenum	NaCl	Registered Trademark of E.I.
mol	Mole	NAFION®	DuPont de Nemours
mol%	Mole percent		Sodium hydride
mol/min	Moles per minute	NaH	Sodium hydroxide
mole/(m ² Pa·s)	Mole per meter squared Pascal second (flux unit)	NaOH	National Aeronautics and Space Administration
MoO ₃	Molybdenum trioxide (molydite)	NASA	National Aeronautics and Space Agency Polymer Energy
MoPc	Molybdenum phthalocyanine	NASA PERS	Rechargeable System
MPa	Megapascal		Carderock Naval Sea Systems
mpgge	Miles per gallon gasoline equivalent	NAVSEA	Command Carderock Division
mph	Miles per hour		Niobium
MRI	Magnetic resonance imaging	Nb	National Center for
MRS	Materials Research Society	NCMS	Manufacturing Sciences
ms	Milliseconds		NIST Center for Neutron Research
mS/cm	Milli-Siemens per centimeter	NCNR	
MSCFD	Thousand standard cubic feet per day gas flowrate	ND	Not determined at this time
MSHA	Mine Safety and Health Administration	Nd:YAG	Neodymium-doped yttrium aluminum garnet
MSU	Montana State University	NDIR	Non-dispersive infrared
MT	Medium-throughput	NEBS	Network Equipment-Building System
MTI	McDermott Technology, Inc.		New European Driving Cycle
mV	Micro volt	NEDC	National Energy Modeling System
mV	Millivolt	NEMS	National Environmental Policy Act
MW	Megawatt	NEPA	National Energy Technology Laboratory
MW	Molecular weight		Northeastern University
mΩ	Milli-ohms	NETL	Near frictionless carbon
MWe	Megawatts electric		National Fire Protection Association
MWh	Megawatt-hour	NEU	Natural gas
MWNT	Multi-wall nanotube	NFC	Ammonia
MWth	Megawatts thermal	NFPA	National Hydrogen Association
MYPP	Multi-Year Program Plan (the HFCIT Program's Multi-Year Research, Development and Demonstration Plan)	NG	
		NH ₃	
		NHA	

NHE	Normal hydrogen electrode	PAFC	Phosphoric acid fuel cell
Ni	Nickel	PBI	Polybenzimidazole
NICC	Natural gas Infrastructure	PCS	Power conditioning system
	Component Cost model	PCT	Pressure concentration
NiMH	Nickel metal hydride	Pd	temperature
NIST	National Institute of Standards and Technology	PDC	Palladium
nm	Nanometer	Pd-MIS	Polymer-derived ceramic
NMHC	Non-methane hydrocarbons	PDU	Palladium-based metal-insulator-semiconductor
NMOG	Non-methane organic gases	PEC	Process development unit
nmol	Nanomole	PECH	Photoelectrochemical
NMP	N-methyl pyrrolidone	PEEK	Polyepichlorohydrin
NMR	Nuclear magnetic resonance	PEFC	Polyetherketones
NO ₂	Nitric oxide	PEFC	Polymer electrolyte fuel cell
NO _x	Oxides of nitrogen	PEI	Proton exchange fuel cell
NPM	Non-precious metal	PEKK	Polyether imide
NPV	Net present value	PEM	Poly (ether ketone ketone)
NRECA	National Rural Electric Cooperative Association	PEMFC	Polymer electrolyte membrane, proton exchange membrane
NREL	National Renewable Energy Laboratory	PEN	Polymer electrolyte membrane fuel cell
NSSN	National Resource for Global Standards	PES	Positive-Electrolyte-Negative
NSTF	Nanostructured thin film	PES	Polyethersulfone
O	Oxygen	PFD	Power Engineering Society
O&M	Operation and maintenance	PFSA	Process flow diagram
O ₂	Diatom oxygen	PGM	Perfluorinated sulfonic acid
O ₂ :C	Oxygen to carbon ratio	PI	Platinum group metal
OCV	Open circuit voltage	PM	Platinum
OEM	Original equipment manufacturer	PM	Particulate matter
OG	Off-gas	PM	Particulate membrane
OH ⁻	Hydroxyl radical	PNNL	Precious metal, such as platinum
OMB	Office of Management and Budget	POC	Pacific Northwest National Laboratory
OPEX	Operating expense	POX	Proof of concept
OPM	Oxford Performance Materials, Inc.	PP1R	Partial oxidation
ORNL	Oak Ridge National Laboratory	ppb	Power Plant One Reformatte
ORR	Oxygen reduction reaction	ppbv	Parts per billion
OTM	Oxygen transport membrane	ppm	Parts per billion by volume
OTT	Office of Transportation Technologies	ppmv	Parts per million
OU	Ohio University	ppmw	Parts per million by volume
P	Phosphorus	ppt	Parts per million by weight
P	Pressure	Pr	Parts per trillion
P&ID	Process and Instrumentation Diagram	PrOx	Praseodymium
Pa	Pascal	PS	Preferential oxidation
PADD	Petroleum Administration for Defense Districts	PS	Photosystem
		PSA	Potentiostatic
		PSAT	Pressure swing adsorption
			Puget Sound Action Team

PSAT	Vehicle simulation software package developed at Argonne National Laboratory	S S/C S/cm	Sulfur Steam-to-carbon ratio Siemens per centimeter
psi	Pounds per square inch	S300	Series 300 fuel processing and PEM cell system
psia	Pounds per square inch absolute		
psid	Pounds per square inch differential	SA SAD	Specific activity Surface-averaged distribution
psig	Pounds per square inch gauge	SAE	Society of Automotive Engineers
PSII	Photosystem II	Sc	Scandium
PSU	Pennsylvania State University	sccm	Standard cubic centimeters per minute
PSU OPP	Penn State University, Office of Physical Plant	SCE	Saturated calomel electrode
PSU PTI	Penn State University, Pennsylvania Transportation Institute	SCF, scf scfd SCFH, scfh	Standard cubic feet Standard cubic feet per day Standard cubic feet per hour
Pt	Platinum	ScSZ	Scadia stabilized zirconia
P-T	Pressure-temperature	SD	Standard deviation
Pt ₃ Co	Platinum-cobalt alloy	SDA	Structure directing agent
Pt ₃ Ni	Platinum-nickel alloy	SDO	Standards Development Organization
PTFE	Teflon – poly-tetrafluoroethylene	Se	Selenium
Pt-FePO	Platinum iron phosphate	sec	Second
PTM	Proton transport membrane	SEM	Scanning electron microscope
PtML	Platinum monolayer	SEMaC	Smart Energy Management Controller
Pt-SnO		SEP	Subscale engineering prototype
Pt-TaPO	Platinum tantalum phosphate	SF ₆	Sulfur hexafluoride
PURE	Promoting Unst Renewable Energy (UK)	SHE	Standard hydrogen electrode
PV	Photovoltaic	Si	Silicon
PVDF	Polyvinylidenefluoride	SiO ₂	Silicon dioxide
P-V-T	Pressure-Volume-Temperature	SLPM	Standard liters per minute
Q1, Q2, Q3, Q4	Quarters of the fiscal year	Sm	Samarium
QFD	Quality Function Deployment	SMR	Steam methane reformer
R&D	Research and development	Sn	Tin
RBS	Rutherford backscattering	SnCl ₂	Stannous chloride
RD&D	Research, development & demonstration	SNG	Synthetic natural gas
RDE	Rotating disk electrode	SNL	Sandia National Laboratory
Re	Rhenium	SO ₂	Sulfur dioxide
RFC	Regenerative fuel cell	SOFC	Solid oxide fuel cell
RFP	Request for proposals	SOM	Solid-oxide oxygen-ion-conducting membrane
RH	Relative humidity	SO _x	Oxides of sulfur
Rh	Rhodium	SPC	Statistical process control
RHE	Reference hydrogen electrode	SPEKK	Sulfonated polyether ether ketone
rpm	Revolutions per minute	sq.ft.	Square foot
RRDE	Rotating ring disc electrode	SR	Steam reformer
RTD	Resistance thermal device	Sr	Strontium
RTI	Research Triangle Institute	SRI	Stanford Research Institute International
Ru	Ruthenium		
s	Second		
S	Siemens		

SS	Stainless steel	TTW	Through the wafer
STAR	Substrate-based Transportation	TWh	TeraWatt-hour
	Autothermal Reformer	TWM	Thermal and water management
STCH	Solar thermochemical hydrogen	Type IV	Plastic lined tanks completely overwrapped with composite
STEM	Scanning transmission electron microscope	UC	University of California
STH	Solar-to-hydrogen	UCP	Uncoupling protein
STM	Scanning tunneling microscope	UGA	University of Georgia, Athens
STTP	Shared Technology Transfer Project	UH	University of Hawaii
SUNY	State University of New York	UHV	Ultra-high vacuum
SWNT	Single-walled nanotube	UL	Underwriters Laboratory
SwRI	Southwest Research Institute	UNIGEN®	A registered trademark of Proton Energy Systems, Inc.
T	Temperature	UPD	Underpotential deposition
t	Time	UPS	Uninterruptible power supply
t/d	tonnes per day	US06	Driving cycle to simulate high-speed vehicle operation
Ta	Tantalum		
TAFV	Transition Alternative Fuels and Vehicles	USC	University of South Carolina
TAG	Technical Advisory Group	USDA	U.S. Department of Agriculture
TC	Thermocouple	USFCC	United States Fuel Cell Council
TCGC	Thermal conductivity gas chromatograph	UTC FC	United Technologies Corporation Fuel Cells
TDARMS	Thermal desorption and recoiling mass spectrometry	UTRC	United Technologies Research Center
TEM	Transmission electron microscopy	UV	Ultraviolet
TESI	Teledyne Energy System Inc.	UV-Vis	Ultraviolet-Visual
Tg	Glass transition temperature	V	Vanadium
TGA	Thermal gravimetric analysis	VASP	Volt
THC	Total hydrocarbons	VC	Vienna Ab-initio Simulation Package
Ti	Titanium	VHTS	Vulcan carbon
TiCl ₃	Titanium trichloride		Virtual high-throughput screening
TiH ₂	Titanium hydride	VNT	Variable nozzle turbine
TIM	Traction inverter motor	VOC	Volatile organic compound
TiO ₂	Titanium dioxide	vol	Volume
TIVM	Toroidal intersecting vane machine	vol%	Volume percent
Tla	Truncated light-harvesting chlorophyll antenna	VR	Voltage – current – resistance curve
tla1	Mutant of the Tla1 gene	W	Tungsten
tlaX	Mutant of unknown gene with a truncated light-harvesting chlorophyll antenna	W	Watt
		W/L	Watts per liter
TM	Transition metal	W/m-K	Watts per meter-Kelvin
TMS	Thermal management system	Ω-cm ²	Ohm-square centimeter
TPD	Temperature-programmed desorption	WDS	Wavelength dispersive spectroscopy
TPR	Temperature-programmed reduction	We	Watt electric
		WGS	Water gas shift
		W-h/kg	Watt-hours per kilogram
		W-h/L	Watt-hours per liter

WHSV	Weight hourly space velocity	XPS	X-ray photoelectron spectroscopy
WO ₃	Tungsten trioxide		
Wt	Watts thermal	XRD	X-ray diffraction
WT	Wild-type (unmutated)	XRF	X-ray fluorescence
wt%	Weight percent (percent by weight)	Y	Yttrium
XANES	X-ray absorption near-edge spectroscopy	Yb	Ytterbium
XAS	X-ray absorption spectroscopy	YSZ	Yttria-stabilized zirconia
Xe	Xenon	ZnO	Zinc oxide
XEDS	Energy dispersive analysis of X-rays	Zr	Zirconium
		ZrO ₂	Zirconium dioxide